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An Appraisal of Trawl Fishery of Kerala

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Abstract

Trawl fishery of Kerala contributes about 35-50% of the annual landings of the state. The ever increasing international demand for shrimps and cuttlefishes further induced acute competition, higher investment and continuous up gradation of trawlers. The technical specifications, capital investment, catch composition and revenue for single and multiday units has drastic differences. The present study aims to highlight the trawl landings of Kerala state and comparative efficiency of these units operating at Cochin Fisheries Harbour. The data was systematically collected during 2005-2006 in a pre-designed schedule covering all seasons. The secondary data was obtained from various publications of State Fisheries Department and CMFRI. The craft and gear specifications of these units indicate the increasing trend of capital intensity in an already overcapitalized sector. The study indicates that the shift towards multi-day units will further increase due to better catch and returns. Although the multi-day trawlers are economically efficient, the wastes and discards generated from these units are not advisable for the long-term sustainable development of our open access marine fisheries. Regulations in terms of number of units, unit operations or quota system for trawlers appear to be imminent for the efficient management of marine fishery resources of the state.

Introduction

In India, trawling on commercial level was commenced at Cochin during early sixties and was later spread to other parts of the country ([Kuriyan, 1965](#)). During late seventies and early eighties, a conspicuous change in the trawlers took place. The major development brought about were change in materials for construction, hull form, marine engines, propulsion system and optimization of energy. Some shrimp trawlers were exclusively operated during night hours. These boats, popularly known as night boats subsequently extended their operations to the day as fish trawl and this cooperation continues for multiple days. By the mid eighties, most of the bigger boats switched over to this type of stay –over fishing to bring quality fishes. This method of fishing resulted in substantial increase in returns mainly by saving the fuel cost. Moreover, these ‘night

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boats' were continuously expanding the trawling grounds and venturing into deeper areas. In recent years, multi-day trawl fishery has expanded considerably and now it exists as a separate fishery. The ever-increasing international demand for shrimps and cephalopods further induce acute competition, higher investment and continuous demand for up gradation of trawlers. The technical specifications, capital investment, catch composition and revenue for single and multi-day day units differs drastically. Keeping an eye on of the duality and rapid technological changes happening in trawl fishery, a comprehensive study with particular emphasis on economic efficiency was done in this study.

Database and methods

The data was systematically collected during 2005-2006 in a pre-designed schedule covering all seasons. The secondary data was obtained from various publications of State Fisheries Department and Central Marine Fisheries Research Institute (CMFRI). The regular costs and earnings data collected during the data collection were utilized for the calculation of the economic indicators such as net profit, rate of return etc. The various components of costs are classified into operating costs and fixed costs. The operating costs include all those costs, which are incurred only when the vessels are under operation and fixed costs are those incurred even if there is no operation. Data on catch (Kg) and efforts were collected on weekly observation of trawl landings. Analysis of economic performance of different types of fishing units was assessed using indicators like net operating income, Capital productivity and labour productivity.

Results and Discussion

A successful trawl design is evolved after many trials and errors in design and field trials. The design of a trawl gear depends on the length of the vessel, horsepower of installed engine, type of fishery to be exploited and fish behaviour. The effective towing power of engine is an important aspect in selection of gear design. A particular design may be a combination of standard designs of related size class of vessel with the same engine horsepower. Specifications of crafts deployed for trawling in Kerala is given in Table:-1.

Both single day and multi day trawlers are in operation in Kerala. The single day trawlers are very old and made of wood. The life of this type of boat is only upto 20 years. They don't have fish hold. Instead ice is used for preserving fish and their efficiency is very low. The depth of trawling ranges from 60-420m. The duration of voyage in single day trawlers is restricted to 7 hours.

Table 1. Specifications of crafts deployed for trawling

Description	Single day boats	Multi day boats
Overall Length (OAL)	9-11.5m	11-17.1m
Breadth	3-4m	3.5-5.0m
Gross tonnage	9-20	15-40
Draught	1.4-1.7	1.6-2.0
Type of construction	Carvel planking with FRP up to deck level	Carvel planking with FRP up to deck level
Materials used	Wood	Wood,steel
Horse Power	35-75	80-160
Fish-hold capacity	Nil	3-15tonnes
Number of crew	4	5-12
Endurance	Single day	Upto 9 days
Navigational and other equipments	Echosounder,Magnetic Compus,GPS,wireless, Mobile	Echosounder, SONAR, Magnetic Compus, GPS, wireless, Mobile, TV, DVD
Life of boat	Upto20years	Upto20years

In Sakthikulangara region, when the fish catch is low they go for chunk fishing at night. Another avocation for them is the Babilonia fishing at night. This gives them very good price in the tune of Rs. 45-60 / Kg for live specimens. The multi day trawlers are made up of steel and they have all modern amenities. The depth of operation ranges from 80-420 m. Some trawlers resort to less than five-day trips. But new boats are going for more than five-day trips, as they are more fuel-efficient.

With the increase in size of vessels, the dimension of the gear also has to be changed for getting maximum efficiency. The trawlers presently operating off Cochin area are resource specific as two main types of trawl nets –for shrimps and fishes are in use. The trend of using different types of gear started in late 1980's. They take both fish net and shrimp net while going for fishing. Some boats in addition to fish and shrimp net also take some other type of nets to catch cephalopods also. Table 2 depicts the specifications of commonly used gears by trawl fleets.

Table 2. Specifications of the gears used by trawl fleets.

Description	Single day boats	Multi day boats	
Type of net	Shrimp net, fish net	Shrimp net	fish net
Length of head rope (m)	27	31	33-37
Length of foot rope (m)	31	35	38-41
Mesh size (mm)			
Body	25-30	10-20	30-38
Cod end	15-18	35-40	22-24
Net material	Nylon	Nylon	Nylon
Thickness (mm)	0.5-0.75	1.0-1.25	2.0-2.5
Otter board:			
Shape	Flat rectangular	Flat rectangular&V shaped	
Weight(kg)	100-130	170-190	
Warp material	16mm synthetic rope	10-12mm wire rope	

Catch composition of trawlers of different combinations

The major species composition in the annual catch of the mechanized trawler varied from centre to centre. In Neendakara, the deep-sea prawns dominated with 64% followed by cuttlefish (11%), whereas in Munambam, the major species landed was the less priced threadfin brems (31%) followed by high priced cuttlefish (24%). Some quantity of ribbon fishes (12%) also was landed here. Prawns contributed only 5% to the total catch. Ribbonfishes were the major contributor in the mechanised trawler at Cochin Fisheries Harbour (60%) followed by cuttlefish (17%).

Economic evaluation

The annual average costs and earnings of various fishing units operating from the selected landing centres were worked out. Along the Kerala cost, sharing of the gross revenue after deducting fuel cost in operational cost is the prevailing system of payment of wages for fishing labour. In the case of trawlers, the labour share is 35%. The other operational costs include auction charges, batas and cost towards repair and maintenance of the craft and gear. In Kerala, the share of workers remains unchanged for the last many years and there has been no attempt on the part of wage earners in fishing industry to get their share increased. This may be because the workers get higher wages each year due to the increase in revenue. This increase in revenue is mainly due to the continuing increase in fish prices in recent years.

The fixed cost includes the interest for initial investment, its depreciation and insurance. Depreciation is the permanent and continuing decline in the value of capital asset, which in the case of mechanized fishing units comprised of hull, engine, gear and other accessories. The depreciation for hull and engine, together constituted the craft, was about 10% of its capital investment assuming a life span of 10 years. The depreciation for the gear used in the mechanized trawler was about 50% assuming a maximum life span of two years.

Economic Performance of both single day and multi day trawlers on trip basis and annual basis was worked out and shown in Table 3 and 4 respectively.

Table 3. Economic Performance of trawlers (Average/trip)

Particulars	Single day trawl	Multi-day Trawl
Catch (Kg)	157	1541
Gross revenue (Rs)	10,121	61,186
Labour (Rs)	3390	10246
Fuel (Rs)	3493	28940
Auction (Rs)	674	3204
Others(Rs)	1203	4441
Operating cost (Rs)	8760	46831
Net operating income (Rs)	1361	14355
Capital productivity ratio	0.86	0.76
Labour productivity (Kg/trip)	39	193

The per trip analysis showed that in single day trawlers 40% of operating cost is spent for fuel and 39% for labour. Though the average gross revenue works out to be Rs. 10121/- the average net operating income works out to be Rs. 1360/ where as in multi day trips 62% of operating cost is for fuel and 22% for labour. Higher operating cost is due to more days spent on voyage, where most of the trawlers went for 9-10 days voyage. Here net operating income per trip is Rs. 14355/- as their gross revenue is more. The major reason for this increased production and revenue is that these crafts are equipped with fish finding devices which help them to locate the more valuable species such as cuttlefish and squids and these crafts have high storage capacity. One very important issue in the case of multi day trawlers is that they are not paying any attention to low value fishes though they are equally efficient in nutritional point of view. If they can give some attention in this regard their returns can be increased. This aspect has to be carefully addressed as these discards are creating some environment

issue also. As the low value and juveniles are discarded or thrown out after catching, mortality rate is very high. In countries like India where protein deficiency is a major nutritional issue this type of crime cannot be tolerated. According to [Sathiadhas \(1998\)](#), community participation in fisheries management should be introduced by creating awareness among fishermen and encouraging 'co-operative fishing' instead of 'competitive fishing'.

The annual profit from the trawlers having Overall Length (OAL) of 9-11.5m and going for single day trips was Rs. 20,24,200/- and the trawlers having Overall Length (OAL) of 11-17.1m and going for multi day trips was Rs. 36,71,160/- (Table 4).

Table 4: Annual Economic Performance of trawlers

Particulars	Single day trawl	Multi-day Trawl
Catch (Kg)	31,400	92,460
Gross revenue (Rs)	20,24,200	36,71,160
Labour (Rs)	6,78,000	6,14,760
Fuel (Rs)	6,98,600	17,36,400
Auction (Rs)	1,34,800	1,92,240
Others(Rs)	2,40,600	2,66,460
Operating cost (Rs)	17,52,000	28,09,860
Net operating income(Rs)	2,72,200	8,61,300
Capital productivity	0.86	0.76
Labour productivity	2530	6798

The single day trawlers operating along the Kerala coast operated with an annual average operating cost of Rs. 17,52,000 (Table 4). The annual catch of these units was 31,400kg generating annual gross revenue of Rs. 20,24,200. Capital productivity (operating ratio) was also worked out to compare the economic efficiency of the trawlers. Capital productivity is defined as the portion of gross revenue that would cover the operating expenses. The operating ratio works out to 0.86, indicating that 86 per cent of gross revenue generated is used to cover its operating expenses. The higher operating cost due to the higher fuel and auction charges can be attributed to the higher value of the operating ratio. Major components of operating expenses are fuel (40 percent) and crew wages (39 per cent).

The annual average operating cost of multi day fishing unit operating in Kerala was Rs. 28,09,860. Almost 84 percent of the operating expenses is incurred on fuel and

wages. The annual catch of these units was 92460 Kg generating annual gross revenue of Rs. 36,71,160. The operating ratio works out to 0.76, indicating that 76 per cent of gross revenue generated is used to cover its operating expenses.

The capital productivity indicators show that the multi day trawlers are more efficient (0.76) compared to single day trawlers operating in Kerala (0.86). Labour productivity is the average quantity of product generated per labourer. Labour productivity for single day trawlers is worked out to be 39 Kg/ labourer whereas in multiday trawlers it was 193Kg/labourer. Hence multiday trawlers are found to be more efficient.

Conclusion

Fishery resources are continuously exploited using fishing vessels whose number, size and effectiveness are always increasing. Marine fishing is capital intensive mainly due to the increased tempo of mechanization as well as motorization of non-mechanized units. According to [Panikkar et al. \(1991\)](#) fishing along our inshore waters is transforming from a subsistence level to a cash crop operation and now the fishermen are very much conscious about their profit margin. The craft and gear specifications of these units indicate the increasing trend of capital intensity in an already overcapitalized sector. The study indicates that the shift towards multi-day units will further increase due to better catch and returns.

Although the multi-day trawlers are economically efficient, the wastes and discards generated from these units are not advisable for the long-term sustainable development of our open access marine fisheries. The major areas to be focused are effort regulation, by-catch exclusion or reduction, use of selective and eco-friendly fishing gear, and bio-socio-economic considerations in management where the coastal communities are involved for preservation of biodiversity and integration of inshore fishing activities with coastal management plans. Regulations in terms of number of units, unit operations or quota system for trawlers appear to be imminent for the efficient management of marine fishery resources of the state.

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